

REPPERGER RESEARCH INTERN PROGRAM

RESEARCH PROJECT #: AFRL-RHD-23-03

Laser Ablation, Shockwave Dynamics, and Laser-Tissue Interactions

PROJECT DESCRIPTION: To advance our understanding of pulsed laser interactions with tissues, it is critical that tools be developed that adequately capture such events in parallel with modeling to interpret the physical meaning of the data acquired. At our laboratory, we have created such a tool and would like to further its development. The aim of the project for the student selected would be to create a second version of our device suitable for capturing high speed thermal images of laser induced breakdown events. In parallel, the student will delve into the theoretical modeling of breakdown, shockwave formation, and the energy balance of laser induced breakdown. Highly competitive applicants will have a working knowledge of either Mathematica, Python, or MATLAB (any of which will do), practical lab experience, and will have completed courses in differential equations and thermodynamics.

ACADEMIC LEVEL: Bachelor's, Master's

DISCIPLINE NEEDED:

- Physics
- Mechanical Engineering
- Biomedical Engineering
- Electrical Engineering

RESEARCH LOCATION: JBSA-Fort Sam Houston, San Antonio, Texas

RESEARCH MENTOR: Allen Kiester, PhD
Physics, University of North Texas, 2022



Allen Kiester joined the Air Force Research Laboratory in 2020 as a research physicist focused on the interaction between electromagnetic waves and cells/tissues. He conducts both modeling and experimental research as part of biomedical optics and bioelectromagnetics research groups. His current efforts include research questions relating to laser-tissue interactions, physics-level modeling of those interactions, developing high speed imaging systems, modeling of electric stimulus of mammalian cells, and developing apparatus to observe nsEP and AC stimulus. *Photo courtesy of the U.S. Air Force Research Laboratory.*